Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL QUALITY MEASURES CLEARINGHOUSE

General

Title

End stage renal disease (ESRD): risk-adjusted standardized hospitalization ratio (SHR) for dialysis facility patients.

Source(s)

Standardized hospitalization ratio (SHR) for admissions measure information form. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 6 p.

Measure Domain

Primary Measure Domain

Related Health Care Delivery Measures: Use of Services

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure is used to assess the risk-adjusted standardized hospitalization ratio (SHR) for dialysis facility patients.

The SHR is a ratio of the number of inpatient hospital admissions among eligible patients at the facility during the reporting period to the number of hospital admissions that would be expected among eligible patients at the facility during the reporting period, given the patient mix at the facility.

Rationale

Hospitalization rates are an important indicator of patient morbidity and quality of life. On average, dialysis patients are admitted to the hospital twice a year and spend an average of 13 days in the hospital per year (U.S. Renal Data System [USRDS], 2009). Hospitalizations account for approximately 35 percent of total Medicare expenditures for end stage renal disease (ESRD) patients (USRDS, 2009). Measures of the frequency of hospitalization have the potential to help efforts to control escalating

medical costs, and to play an important role in identifying potential problems and helping facilities provide cost-effective health care.

At the end of 2007 there were 562,085 patients being dialyzed of which 111,000 were new (incident) ESRD patients (USRDS, 2009). In 2007, total Medicare costs for the ESRD program were $23.9 billion, a 6.1% increase from 2006 (USRDS, 2009). Correspondingly, hospitalization costs for ESRD patients are very high with Medicare costs of over $8 billion in 2007.

Hospitalization measures have been in use in the Dialysis Facility Reports (DFR) (formerly Unitâ€Specific Reports) since 1995. The DFRs are used by the dialysis facilities and ESRD Networks for quality improvement, and by ESRD state surveyors for monitoring and surveillance. In particular, the standardized hospital ratio (SHR) for Admissions is used by ESRD state surveyors in conjunction with other standard criteria for prioritizing and selecting facilities to survey and has been found to be predictive of citations in the past (ESRD State Outcomes List).

Evidence for Rationale

Standardized hospitalization ratio (SHR) for admissions measure information form. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 6 p.

U.S. Renal Data System. USRDS 2009 annual data report: atlas of chronic kidney disease and end-stage renal disease in the United States. Bethesda (MD): National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases; 2009.

Primary Health Components

End stage renal disease (ESRD); dialysis; standardized hospitalization ratio (SHR)

Denominator Description

Number of hospital admissions that would be expected among Medicare dialysis patients (adult and pediatric) at the facility during the reporting period, given the patient mix at the facility (see the related "Denominator Inclusions/Exclusions" field)

Numerator Description

Number of inpatient hospital admissions among eligible patients at the facility during the reporting period (see the related "Numerator Inclusions/Exclusions" field)

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

A formal consensus procedure, involving experts in relevant clinical, methodological, public health and organizational sciences

Additional Information Supporting Need for the Measure

Unspecified

Extent of Measure Testing

Reliability Testing

Data/Sample
Reliability of the standardized hospital ratio (SHR) for admissions was assessed using data on hospitalizations among end stage renal disease (ESRD) patients over a three year period of 2006 to 2008 for 4338 dialysis centers. Data for the hospitalization measures are derived from an extensive national ESRD patient database, which is largely derived from the Standard Information Management System (SIMS) database maintained by the 18 ESRD Networks, the Centers for Medicare & Medicaid Services (CMS) Annual Facility Survey (Form CMS-2744), Medicare dialysis and hospital payment records, the CMS Medical Evidence Form (Form CMS-2728), transplant data from the Organ Procurement and Transplant Network (OPTN), the Death Notification Form (Form CMS-2746), the Nursing Home Minimum Dataset, and the Social Security Death Master File. The database is comprehensive for Medicare patients. Information on hospitalizations is obtained from Medicare Inpatient Claims Standard Analysis Files (SAFs).

Analytic Methods
To assess reliability, we assessed the degree to which the measures were consistent year to year. If one looks at two adjacent time intervals, one should expect that a reliable measure will exhibit correlation over these periods since large changes in patterns affecting the measure should not occur for most centers over shorter periods. Year to year variability in the SHR values was assessed across the years 2006, 2007 and 2008 based on the 4338 dialysis centers for which an SHR is reported in the 2010 Dialysis Facility Reports (DFRs).

Testing Results
The correlation between SHR admissions across adjacent years (2006 versus 2007 and 2007 versus 2008) was approximately 0.67 indicating that centers with large or small SHR tended to have larger or smaller SHR on the following year. These correlations were highly significant. Similarly, there was persistence in SHRs that were significant from year to year. For example, there were 4.3% of facilities that had significant evidence of a true SHR of at least 1.2 in 2006. Of those that were significantly larger than 1.2 in 2006, 1.8/4.3 = 42% were again significantly larger than 1.2 in 2007. Of those that were not significant in 2006, only 2.5% were found to be significantly larger than 1.2 in 2007.

The measure is based on complete data and is not subject to judgment or rater variability. Hence the measures of inter-rater variability are not relevant here.

Validity Testing

Data/Sample
Validity of the SHR for admissions was assessed using data on hospitalizations as well as other quality measures among ESRD patients over a three year period of 2006 to 2008. We examined the validity of the measure by examining its covariability with other measures of quality as well as by examining the relationship of the overall hospitalization measure with measures that were more directly focused on specific causes.

Analytic Method
We have assessed the validity of the measure through various comparisons of this measure with other quality measures in use. Also, hospitalization measures were reviewed by a technical expert panel (TEP) in 2007 and overall measures based on admissions and on days were recommended for inclusion in the DFRs. In addition, hospitalization is a major cost factor in the management of ESRD patients as noted earlier, so there is here a very strong case for face validity of the SHR admissions measure.

Testing Results
The SHR admissions measure is correlated with the standardized mortality ratio (SMR) over the three year cohort (r=0.40) and in individual years r was approximately equal to 0.33, both correlations being highly significant. In addition, SHR admissions is negatively correlated in each of the three year with percent of patients in the facility with AV fistula (r=-0.27, -0.23, -0.21). Thus higher values of SHR are associated

with lower usage of arteriovenous (AV) fistulas. On the other hand, SHR admissions is positively correlated with catheter use (r=0.24, 0.23, 0.22), indicating that higher values of SHR are associated with increased use of catheters. These correlations are all highly significant (p less than 0.001). The SHR admissions is also found to be negatively correlated (r=-0.10, p less than 0.0001) with the percent of patients with urea reduction ratio (URR) greater then 65, again in the direction expected. The SHR admissions is an overall measure of hospital use and is comprised of many different causes or reasons for hospitalization. The TEP considered the possibility of devising cause specific SHRs, but recommended the use of overall SHR measures due to various reasons including the lack of clear research to indicate what causes should be selected as indicative of poor ESRD care and issues associated with inter-rater reliability in assessing cause of hospitalization. The TEP reached a strong consensus that the overall measures should give a reliable and valid measure that would typically be related to quality of care. We have some crude measures of cause of hospitalization which we have taken to assess the relationship between the overall measure and cause specific components. These measures are useful in assessing the overall SHR measures, but we caution that the cause specific hospitalizations have not been tested or validated at this time. The overall SHR Admissions is strongly correlated with the SHR for cause specific hospitalizations. The correlation with septicemia is r=0.44, with chronic heart failure is r=0.55 and with an overall measure including septicemia and a collection of coronary causes is r=0.66. Thus the overall hospitalization rate also correlates strongly with causes that are commonly thought to be potentially related to poor quality of care.

Evidence for Extent of Measure Testing

Centers for Medicare & Medicaid Services (CMS). National Quality Forum (NQF) measure information: standardized hospitalization ratio for admissions. Washington (DC): National Quality Forum (NQF). 2014 Oct 15. 10 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Ambulatory Procedure/Imaging Center

Hospital Inpatient

Hospital Outpatient

Managed Care Plans

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Does not apply to this measure

Target Population Age

Unspecified

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Priority

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Not within an IOM Care Need

IOM Domain

Not within an IOM Domain

Data Collection for the Measure

Case Finding Period

The reporting period

Denominator Sampling Frame

Enrollees or beneficiaries

Denominator (Index) Event or Characteristic

Institutionalization

Therapeutic Intervention

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions

Number of hospital admissions that would be expected among Medicare dialysis patients (adult and pediatric) at the facility during the reporting period, given the patient mix at the facility

Note: The expected number of admissions is calculated from a Cox model, adjusting for patient age, sex, diabetes, duration of end stage renal disease (ESRD), nursing home status, patient comorbidities at incidence, body mass index (BMI) at incidence, and calendar year.

Exclusions

- Patients on dialysis for less than 90 days
- Patients who have not been treated at the facility for at least 60 days.
- Patient-months not within two months after a month with either: (a) $900+ of Medicare-paid dialysis claims OR (b) at least one Medicare-paid inpatient claim

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions

Number of inpatient hospital admissions among eligible patients at the facility during the reporting period

Note:

- The number of admissions includes multiple admissions (i.e., second, third, etc. hospitalizations for the same patient).
- If a patient was admitted near the end of one year and not discharged until the following calendar year (e.g., admitted on 12/28/2009 and discharged on 1/6/2010), the admission would count only in the first year (one admission in 2009 and zero admissions in 2010).

Exclusions

Unspecified

Numerator Search Strategy

Institutionalization

Data Source

Administrative clinical data

Registry data

Type of Health State

Does not apply to this measure

Instruments Used and/or Associated with the Measure

Unspecified

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Ratio

Interpretation of Score

Does not apply to this measure (i.e., there is no pre-defined preference for the measure score)

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

The denominator of the standardized hospitalization ratio (SHR) uses expected hospital admissions calculated from a Cox model (Cox, 1972) as extended to handle repeated events (Lawless & Nadeau, 1995; Lin et al., 2000; Kalbfleisch & Prentice, 2002). For computational purposes, the Centers for Medicare & Medicaid Services (CMS) adopt a model with piecewise constant baseline rates (e.g., Cook & Lawless, 2007) and computational methodology as developed in Liu, Schaubel and Kalbfleisch (2010). A stage 1 model is first fitted to the national data with piecewise-constant baseline rates stratified by facility; hospitalization rates are adjusted for patient age, sex, diabetes, duration of end stage renal disease (ESRD), nursing home status, body mass index (BMI) at incidence, comorbidity index at incidence, and calendar year. This model allows the baseline hospitalization rates to vary between strata (facilities), but assumes that the regression coefficients are the same across all strata; this approach is robust to possible differences between facilities in the patient mix being treated. The linear predictor for each patient based on the regression coefficients in the stage 1 model is used to compute a risk adjustment factor that is then used as an offset in the stage 2 model.

Refer to the original measure documentation for additional information.

Standard of Comparison

not defined yet

Identifying Information

Original Title

Standardized hospitalization ratio (SHR) for admissions.

Measure Collection Name

End Stage Renal Disease (ESRD) Quality Measures

Submitter

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Developer

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Funding Source(s)

Centers for Medicare & Medicaid Services (CMS)

Composition of the Group that Developed the Measure

Arbor Research Collaborative for Health, in collaboration with the University of Michigan Kidney and Epidemiology Cost Center (UM-KECC), develop, maintain, and update the End Stage Renal Disease (ESRD) Quality Measures for the Centers for Medicare & Medicaid Services (CMS), under the Quality Measure Development and Maintenance contract with CMS.

Financial Disclosures/Other Potential Conflicts of Interest

Unspecified

Endorser

National Quality Forum - None

NQF Number

not defined yet

Date of Endorsement

2013 Apr 17

Measure Initiative(s)

Dialysis Facility Compare (DFC)

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2014 Jan

Measure Maintenance

Unspecified

Date of Next Anticipated Revision

Unspecified

Measure Status

Please note: This measure has been updated. The National Quality Measures Clearinghouse is working to update this summary.

Measure Availability

Source not available electronically.

For more information, contact Valarie Ashby at the Kidney Epidemiology and Cost Center, The University of Michigan, 1415 Washington Heights, Suite 3645 SPHI, Ann Arbor, MI 48109-2029; Phone: 734-763-6611; Fax: 734-763-4004; Email: valarieb@med.umich.edu; Web site: Dialysis Data Web site .

Companion Documents

The following is available:

Centers for Medicare & Medicaid Services. National Quality Forum (NQF) measure information: standardized hospitalization ratio for admissions. Washington (DC): National Quality Forum (NQF); 2014 Oct 15. 10 p.

NQMC Status

This NQMC summary was completed by ECRI Institute on December 5, 2014. The information was verified by the measure developer on February 6, 2015.

The information was reaffirmed by the measure developer on April 22, 2016.

Copyright Statement

Production

Source(s)

Standardized hospitalization ratio (SHR) for admissions measure information form. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 6 p.

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